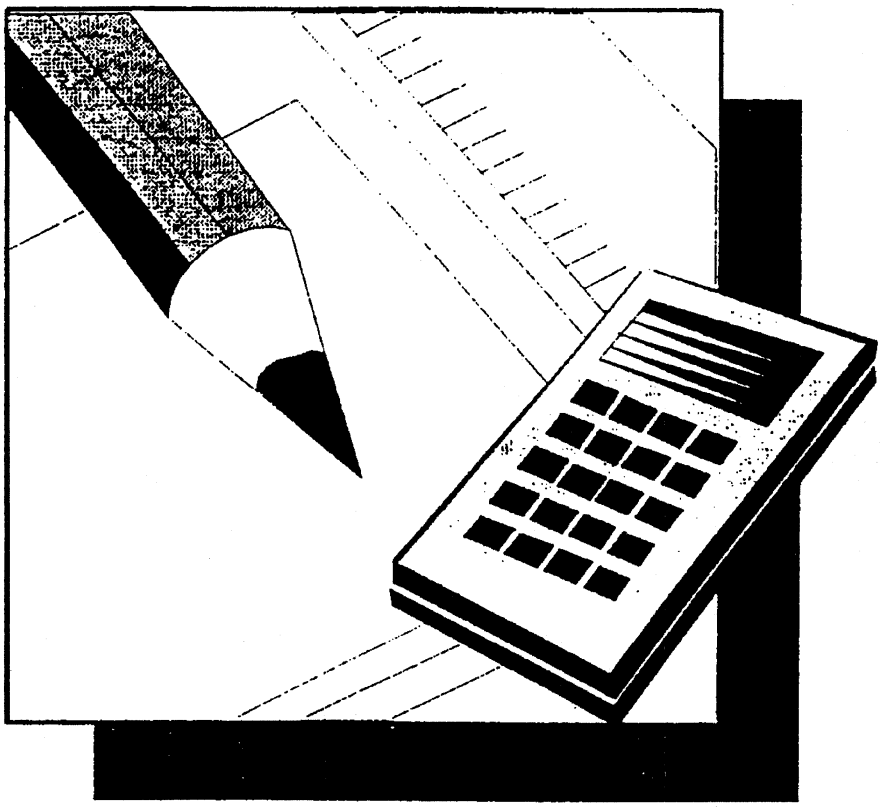
WEEKLY MANUAL TANK GAUGING

for

Small Underground Storage Tanks



CALIFORNIA

STATE WATER RESOURCES CONTROL BOARD
UNDERGROUND STORAGE TANK PROGRAM

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Why You Should Read This Booklet

Federal and state laws require underground storage tanks (USTs) to have leak detection. A lot of attention has been focused on large gasoline tanks, but it is also important to detect leaks from tanks 1,000 gallons or smaller.

If your USTs do not have leak detection, you can be cited for violations and fined. Leak detection violations may also keep you from getting legally required insurance coverage and reimbursement for cleanup costs. Without leak detection, you constantly risk discovering a leak only after it becomes a major financial burden for yourself and an environmental problem for everyone.

Manual tank gauging is a unique leak detection method that can be used only on single-wall tanks 1,000 gallons or smaller. If this method is appropriate for any of your USTs, this booklet can help you make sure you do manual tank gauging correctly. Do not confuse manual tank gauging with manual inventory reconciliation.

If you need information on the various methods of leak detection available to you, call the State Water Resources Control Board's UST Section at (916) 227-4303 to get a copy of the California's UST Regulations.

How Does Manual Tank Gauging Work?

This booklet helps you use manual tank gauging to meet California regulatory leak detection requirements by showing you how to do three important tasks:

- Good dipsticking
- Good math
- Good record keeping

Without these three, you may fail to meet the leak detection requirements. Steps 1 through 5 on the following pages show you how to perform manual tank gauging correctly.

Basically, manual tank gauging involves **taking the tank out of service every week for 48 hours or more** while you measure the tank's contents to see if changes in the tank's volume indicate a possible leak. (The 48 hours includes a 12-hour period during which product may not be added to the tank followed by a 36-hour period during which product may not be added or withdrawn from the tank.)

Manual tank gauging can be used only on tanks 1,000 gallons capacity or smaller. Be sure you read the several important restrictions on the use of manual tank .gauging that are described on the next page**.**

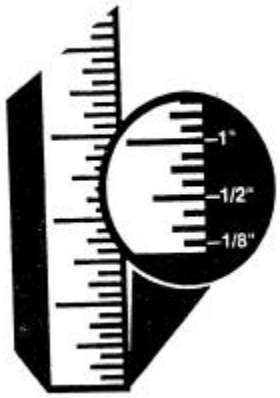
To use MANUAL TANK GAUGING correctly, follow Steps 1 - 5, starting on page 5.

Please note these important restrictions on the use of manual tank gauging:

- Manual tank gauging can be used only on single-wall tanks 1,000 gallons or smaller.
- Tanks 550 gallons or smaller can use this method alone.
- Tanks from 551 gallons to and including 1,000 gallons can use this method alone if the testing period is extended to 60 hours.
- Manual tank gauging cannot be used as a leak detection method on tanks with secondary containment. Secondarily contained tanks must be monitored in the interstitial space.
- The use of manual tank gauging does not meet your tank system's leak detection requirements for piping. Pressurized, gravity-flow, and some suction piping must use other methods of leak detection, such as piping precision testing. (See Article 4 of California's UST regulations)

If you don't pay careful attention to these restrictions, you will fail to meet the leak detection requirements.

Do You Have The Right Equipment?



Gauge Stick Or Other Gauges

The gauge stick used to measure the depth of liquid in an underground tank must be marked or notched to the 1/8 inch, starting with zero at the bottom end. Check your stick to be sure the end has not been worn or cut off and that the stick is not warped. The stick should be made of non-sparking material, such as wood, and varnished to minimize the creeping of fuel above the actual fuel level in the tank. Instead of using a gauge stick, you may use a mechanical or electronic tank level monitor. Whatever measuring device you use must be capable of measuring the level of product over the full range of the tank's height to the nearest 1/8 inch.

Find out if local requirements have limitations on the use of manual tank gauging or have requirements different than those presented here. You can also use other standard forms, if they show the information that state and federal regulations require.

Forms

The instructions in this booklet are keyed to the " WEEKLY MANUAL TANK GAUGING" form. Near the back of the booklet, you will find a blank "master" you can copy repeatedly to provide forms for use in your recordkeeping. If the "WEEKLY MANUAL TANK GAUGING" form is filled out according to the instructions in this booklet, you will be in compliance with California regulations for manual tank gauging.

Tank Chart

STICK READING	GALLONS
21-5/8"	586
21-3/4"	591
21-7/8"	596
22"	601
22-1/8"	606
22-1/4"	611
22-3/8"	616
22-1/2"	621
[illegible]	[illegible]

A tank chart is a table that converts the number of inches of liquid in the tank into the number of gallons. You need a tank chart that exactly matches your storage tank (tank manufacturers usually provide charts for their tanks). If you have more than one tank, you will need a chart for each tank unless the tanks are identical. The tank chart must show conversion to gallons for each 1/8 inch stick reading. If your tank chart does not convert each 1/8 inch reading into gallons, contact the tank manufacturer, or, if you have a steel tank, the Steel Tank Association (708 438-8265) to get an appropriate chart.

You always need to convert inches into gallons in order to fill out the form correctly and to do the necessary math. To convert inches into gallons, find your stick's reading to the nearest 1/8 inch on the tank chart, then simply read across to the gallons column to find the number of gallons. If you cannot get a tank chart showing conversion to gallons for each 1/8 inch reading, you must do the additional math explained on page 8.

Step I - Find The Right Testing Period

Once each week you must take your tank out of service for a testing period. The length of the testing period depends on the size of your tank and whether you are using manual tank gauging alone or in combination with tank tightness testing.

A. **Check your tank size and test duration in the table at the bottom of the "WEEKLY MANUAL TANK GAUGING" form so you will know which you are using**. You know which testing period you need to use **every week** by looking at the number of hours in the "Testing -Period" column. With tanks of 551 to 1,000 gallons, you can choose a shorter test time (48 hours) ***with annual tightness testing*** or a longer test time (72 hours) ***without tightness testing***.

USE THE SAME *"WEEKLY MANUAL TANK GAUGING RECORD"* FORM ON THE LAST OF THE BOOKLET TO SEE WHERE YOU PUT THE INFORMATION FROM LETTERS "A" THROUGH "J" IN THESE DIRECTIONS.

During the test period, the tank must remain out of service so that nothing is put into the tank and nothing is taken out of it.

Step 2 - Measure The Tank's Contents

Every week, you must take liquid level measurements twice before and twice after each out-of-service testing period.

B. Fill in the identifying information at the top of the "WEEKLY MANUALTANK GAUGING" form. You need a separate form for each tank using manual tank gauging.

C. Take two stick readings using "good sticking practices" noted in the box on the right. Wipe the dipstick dry with a rag in between the two readings. Enter the average of the two readings to nearest 1/8 inch in the column labeled "Stick Measurement". This average is your beginning measurement in row (a).

USE GOOD STICKING PRACTICES: SLOWLY LOWER THE GAUGE STICK, LET THE STICK GENTLY TOUCH BOTTOM, AND QUICKLY BRING IT BACK UP. READ THE DEPTH OF THE FUEL INDICATED BY THE WET MARK ON THE STICK TO THE NEAREST 1/8 INCH.

D. In high ground water areas where the ground water level is above the bottom of the tank, it is a good idea to take a beginning water level reading (using water-finding paste) to identify the presence of water inside the tank.

After the readings are taken, the tank opening should be closed so that no liquid can be added or removed from the tank.

E. When the testing period is over, take two more stick readings in the same way you took the first two readings. Enter the average of the two to the nearest 1/8 inch in the column labeled "Stick Measurement". This average is your ending measurement in row (b).

F. It is a good idea to take an ending water level reading (using a water-finding paste), especially in high ground water areas. Water levels inside the tank can be compared over the course of time to identify a water ingress problem.

Step 3 - Do Some Math

Every week at the end of the test period, you must record some math calculations.

G. The average stick reading of the tank's contents will be in inches. You always need to convert **inches** into **gallons** in order to fill out the form completely and to calculate the change in the tank volume. Find your stick's reading on the tank chart to the nearest 1/8 inch, then read across to the gallons column to find the number of gallons. **Enter the result in the "Gallons from tank chart" column in row (a) for the beginning measurement. Do the same conversion to gallons in row (b) for the ending measurement**.

Your tank chart should have direct conversions from 1/8 inch stick readings to gallons. If you cannot get a tank chart with 1/8 inch conversions, do the additional math explained on page 8.

H. Subtract the ending measurement in gallons from the beginning measurement in gallons. **Enter the result in the column labeled "Variation".**

Step 4 - Find The Right Test Standards –

I. The **weekly** and **monthly** test standards depend on tank size and whether you are using manual tank gauging alone or in combination with tank tightness testing. To find your tank's weekly and monthly test standards, locate your tank on the table at the bottom of the "WEEKLY MANUAL TANK GAUGING" form (see the section labeled "I"). You know which test standards apply to your tank by looking at the gallon numbers in the "Weekly Standard" and "Monthly Standard" columns next to your tank.

Circle the weekly and monthly test standards in the table that apply to your tank so you will know which standards your tank must meet.

Step 5 - Compare Your Measurements With Test Standards

You must compare your calculation of "Variation" to the weekly and monthly test standards for your tank in order to determine whether the allowable variations are exceeded.

Every week, compare your "Variation" number to the weekly test standard. For the purpose of this comparison, consider all numbers to be positive (for example, a -16 would become a +16). If your "Variation" number is not larger than the weekly test standard, the tank passed that week's test. If your "Variation" number is larger than the weekly test standard, then the allowable variation is exceeded, and the tank failed that week's test. **If the weekly allowable variation is exceeded, necessary follow-up actions described in Section 2645 of the California UST regulations must be met.**

J. **Once a month**, add up the 4 weekly "Variation" numbers: this time pay careful attention to positive and negative numbers to get an accurate total. For example, adding +4 and +3 and -2 and -1 should equal +4. After you have the sum of the 4 weekly tests, divide by 4 to get the monthly test average. **Enter the result at the bottom of the "Variation" column.**

Compare your monthly variation to the monthly test standard for your tank. For the purpose of this comparison, again consider all numbers to be positive (for example, a -16 would become a +16). If your "monthly variation" number is not larger than the monthly test standard, then the tank passed the monthly test. If your monthly variation is larger than the monthly test standard, then the allowable variation is exceeded, and the tank failed the monthly test.

If the monthly variation is exceeded, a second 48-hour or 72-hour test must be conducted immediately. If the tank fails the second test, then a tank integrity test must be conducted as soon as possible.

Keep your manual tank gauging records on file for at least 1 year. Also, keep a record of the last tank tightness test. If you use the method that combines manual tank gauging with periodic tank tightness testing.

Using Tank Charts Without 1/8 Inch Conversions

If your tank chart does not list direct conversions from inches to gallons or every 1/8 inch, then you must **do the additional math described below every time you stick your tank**.

The easiest way to explain this procedure is with an example. Let's say you have a stick reading of 23 3/8 inches and you need to figure how many gallons are in your tank.

STICK READING	GALLONS
22"	265
23"	293
24"	325
25"	360
26"	407
27"	444

1. Look on your tank chart and find the inch measurements that are just above and below your stick reading and write down the number of gallons for these inch readings. Subtract the gallon readings to find the difference between the two readings:

Chart reading at 24 inches:	325 gallons
Chart reading at 23 inches:	293 gallons
Difference:	32 gallons

2. Dividing 32 by 8 will give you the number of gallons for each 1/8 inch, which is 4 gallons. (Round off the number to the nearest whole number). Because your fraction is 3/8 multiply 4 gallons by 3, which gives you 12 gallons as the volume represented by 3/8 inch.

   CAUTION: The gallons represented by each 1/8 inch will vary from top to bottom of the tank and must be calculated for each conversion. Take the number of gallons you have just calculated and add it to the inch reading just below your actual stick reading:

Chart reading at 23 inches:	293 gallons
Gallons at 3/8 inch:	+12 gallons
Sum:	305 gallons

Thus, your stick reading of 23 3/8 inches converts to 305 gallons.

NOTE: If your tank chart is in half or quarter inches, you must still use this procedure so that your gallon readings are accurate to 1/8 inch.

After doing all of this math, you can see why it pays to have the correct tank chart that indicates gallons for each 1/8 inch.

WEEKLY MANUAL TANK GAUGING
for small tanks

Manual tank gauging may be used as the sole method of leak detection or in combination with tank tightness testing only for tanks of 1,000 gallons or less in accordance with the limitation below.

Facility:			
Address:		City:	
Tank No.:	Tank Capacity:	Product:	Month/Year:
Date of last tank test:	Pass or Fail:	Date of last piping test:	Pass or Fail:

	Date	Time	Inches of Water	Stick measurement (1/8" increments)	Gallons from tank chart	Variation (gallons)
Week 1						
(a)						
(b)						(c)
Week 2						
(a)						
(b)						(c)
Week 3						
(a)						
(b)						(c)
Week 4						
(a)						
(b)						(c)

(d) Monthly: _____

(a) Beginning measurement. No inputs shall occur within the previous 12 hours.
(b) Ending measurement. Taken at least 36 or 60 hours after beginning measurement
(c) Subtract (a) from (b). Indicate if over (+) or short (-).
(d) Algebraically add all ©'s and divide by 4 to get monthly average variation.

Check One:	Tank Size (Gallons)	Weekly Standard (One Test) (Gallons)	Monthly Standard Average of 4 Tests) (Gallons)	Testing Period * (Hours)	Total time Out of Service (Hours)
( )	500 or Less	10	5	36	48
( )	551 to and including 1,000	12	6	60	72
( )	**551 to and including 1,000	13	7	36	48

* The tank must be taken out of service at least 12 hours before the test (gauging) period begins
** An annual tank integrity test is required.

NOTE: If the weekly or monthly allowable variation is exceeded, necessary follow-up actions described in Section 2645 of the California UST regulations must be met.

Wmtg (1/99)